5-Year Research Plan Outline

Working Title:

NOAA's 5-Year Research and Development Plan

Chapter Outline:

a. What is the purpose of 5YRP, how it is used.
b. Building on the 2008-12 foundation
c. Efforts to strengthen Science in NOAA
Critical Concepts:

Situating NOAA R&D to respond nimbly emerging issues – proactive and forward-thinking

People, including partners, as a primary asset

1. Introduction: Why Research and Development?
    a. Our Research Vision
    b. NOAA and Society
        i. Saving lives, protecting property, providing for the future
        ii. Legislative drivers for NOAA R&D
        iii. From Knowledge (Exploration and Research) to Application
            1. Informing decisions locally and globally
                a. Quantifying and communicating uncertainty
                b. Incorporating social sciences methodologies
            2. Expanding economic opportunities through knowledge
            3. Our approach for implementing R2O/A
                a. Whole processing including LOTMs, testing, TRLs
        iv. Illustrative success story (highlighting partnerships)
2. NOAA's Strategic Approach to Research and Development
    a. Introduction
        i. Overarching science questions
        ii. Develop and apply holistic, integrated Earth system approaches (entire S&T enterprise)
        iii. Use-inspired research
    b. NOAA Goal: Climate Adaptation and Mitigation
        i. Introduction to goal and objectives
        ii. Key research questions
            1. What is the state of the climate system and how is it evolving?
                a. Objectives
                    i. targets
            2. What causes climate variability and change on global to regional scales?
                a. Objectives
                    i. targets

3. What improvements in global and regional climate predictions are possible?
    a. Objectives
        i. targets
4. How can the Nation best adapt to the impacts of climate variability and change?
    a. Objectives
        i. targets

c. NOAA Goal: Weather-Ready Nation Weather
    i. Introduction to goal and objectives
        1. How can we improve forecasts, warnings, and decision support for high-impact weather?
            a. Objectives
                i. targets
        2. How does climate affect seasonal weather and extreme weather events?
            a. Objectives
                i. targets
        3. How can we improve space weather warnings?
            a. Objectives
                i. targets
        4. How can we improve forecasts for freshwater resource management?
            a. Objectives
                i. targets

d. NOAA Goal: Healthy Oceans
    i. Introduction to goal and objectives
    ii. Key research questions
        1. How do environmental changes affect marine ecosystems?
            a. Objectives
                i. Targets
        2. What exists in the unexplored areas of our oceans?
            a. Objectives
                i. targets
        3. How can emerging technologies improve ecosystem-based management?
            a. Objectives
                i. targets
        4. How can we ensure aquaculture is sustainable?
            a. Objectives
                i. targets
        5. How is the chemistry of our ocean changing and what are the effects?
            a. Objectives
                i. targets

e. NOAA Goal: Resilient Coastal Communities and Economies
    i. Introduction to goal and objectives
    ii. Key research questions
        1. What is the value of coastal ecosystems?

a. Objectives
    i. targets
2. How do coastal species respond to habitat loss, degradation and change?
    a. Objectives
        i. targets
3. How do we ensure that growing maritime commerce stays safe and sustainable?
    a. Objectives
        i. targets
4. How do we reduce the economic and ecological impacts of degraded water quality?
    a. Objectives
        i. targets
5. How is the Arctic affected by expanding industry and commerce?
    a. Objectives
        i. targets

f. NOAA Enterprise: Science and Technology
    i. Introduction to goal and objectives
    ii. Key research questions
        1. How can we improve the way scientific information and its uncertainty are communicated?
            a. Objectives
                i. targets
        2. How can we improve the capacity of the public to respond effectively to changing environmental conditions?
            a. Objectives
                i. targets
        3. What is the best observing system to meet NOAA's mission?
            a. Objectives
                i. targets
        4. How can we best use current and emerging environmental data?
            a. Objectives
                i. targets
        5. How can we improve the way we manage data?
            a. Objectives
                i. targets
        6. How can modeling be best integrated and improved with respect to skill, efficiency, and adaptability?
            a. Objectives
                i. targets
        7. What is the uncertainty in NOAA's data, analyses, and predictions?
            a. Objectives
                i. targets
        8. What technological developments can help NOAA improve its science enterprise?
            a. Objectives

i. targets

3. Core Capabilities and Assets for Research and Development
    i. Labs
    ii. Personnel
    iii. Modeling and Data Assimilation
    iv. Observation Platforms (e.g., ships, satellites, unmanned systems)
    v. Test Beds/Proving Grounds
    vi. HPC and IT
    vii. Partner network
4. Administering NOAA's Research and Development Enterprise
    a. Overarching Philosophy
        i. **Integrity**: For science to be useful, it must be credible. To be credible, our research must be conducted with the utmost integrity and transparency. NOAA's Administrative Order and codes of conduct for scientists and science managers underpin our results and allow us to operate as trusted source for environmental information.
        ii. **Integration:** we seek to integrate disparate activities to deliver a Holistic Understanding of the Earth System (to include biota)
        iii. **Innovation**: we seek to foster innovation and effectively transition the resulting knowledge and products to the public and/or our operational Line Offices
        iv. **Balance:** Short/long term, low/high risk, "push/pull," internal versus external, within and across goal and enterprise objectives
        v. **Collaboration:** we seek to expand and enhance our capabilities and deliver the best science possible through a diverse tool set including extramural funding, partnerships, extension agents, and outreach
    b. Keys to Success
        i. Introduction-what is "success"? what is "strengthening science"?
            1. Implementing NAO is part of the SEE process
            2. Analysis, assessment, coordination, evaluation, and allocation
        ii. Planning for Discovery and Use
            1. Planning for a balanced portfolio
            2. Creating and Improved product content and design
            3. Setting concrete objectives for R&D
            4. Two paths: Long-term, visionary vs. near-term implementation
            5. Transition of knowledge and technology applications
        iii. Engaging Stakeholders in a two-way conversation
            1. Strategic communications for shared objectives
            2. Partnerships/interdependent relationships, beneficiaries/contributors, Leveraged capabilities and capacities, (e.g., CIs, Public Private Partnerships)
            3. NOAA's role in the domestic research community
                a. Charting a course for R&D
                b. Supporting small business and innovation
                    i. Illustrative success story
                c. Working with academia
            4. NOAA's international leadership

        a. IPCC
        b. Other notable examples
    iv. Setting Priorities
        1. Roles of Research Council, SAB, and other "top down" guidance
        2. Roles of accountable staff, organizations executing R&D mandates/authorities employing "bottom up" usable science and strategy/budget/performance criteria
        3. Processes for criteria-based priority setting within, between, among, and across executing organizations/programs/projects
    v. Evaluating R&D in order to improve it
        1. Empirical understanding of how R&D happens, using evidence-based decision-making essential to maintaining scientific integrity
        2. Quality, Relevance and Performance
        3. Managing a portfolio and "balance" for an R&D portfolio (internal versus external and within and across goal and enterprise objectives
5. Conclusion: Beyond the Plan
    a. 5YR Plan as a guide for research and development
    b. 5YR Plan as a tool to evaluate progress
    c. 5YR Plan as a sign-post for the next strategic plan
6. Appendices